

APPEC Report

APPEC Consortium

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APPEC 2018

RIA (Ireland)

STFC (UK)

FOM (NL)

FRS-FNRS, FWO (Belgium)

CEA, CNRS (France)

SNSF (Switzerland)

LSC (Spain)

FCT (Portugal)

OSI (Finland)

VR (Sweden)

DESY, KIT (Germany)

JINR (Dubna, Russia)

NCN (Poland)

IEAP-CTU (CZ)

INFN (Italy)

IFIN-HH (Romania)

CSF (Croatia)

NOA (Greece)

Observers: CERN, ECFA, ESO, NCN, CSF

Launch of the Roadmap event

<https://indico.nikhef.nl/event/767/>

- Plenary session: A. Masiero (APPEC Chair), RJ Smits, G. Rossi, J.van den Brand, Cordova (NSF) , E. Elsen (CERN), Ivison (ESO)

About APPEC: [Strategic objectives](#)

- Coordination of European Astroparticle Physics
- Develop and update long term strategies (roadmap)
- Express collective views on APP in international fora

[Implementation objectives](#)

- Coordination between existing/developing national activities
- Convergence of future large scale projects/facilities
- Organisational advice for implementation of large facilities
- Launch common calls funded by a (virtual) common pot

Job de Kleuver

Public Roadmap (2017-2020):

<http://www.appec.org/wp-content/uploads/2017/08/APPEC-Strategy-Book-Proof-23-Nov-2.pdf>

<http://www.appec.org/roadmap>



European Astroparticle
Physics Strategy
APPEC 2017-2026

Scientific issues – 13×

- *Large-scale: CTA, ν -telescopes, Auger, GW*
- *Medium-scale: Dark Matter, ν -mass, $0\nu\beta\beta$*
- *+PP: ν -mixing; +ASTRO: Dark Energy & CMB*
- *Base: theory, R&D, computing
deep-underground laboratories*

Organisational issues – 5×

- *European Commission*
- *European collaboration/coordination*
- *Global collaboration/coordination*
- *Particle physics & Astronomy*
- *Inter-disciplinary opportunities*

Societal issues – 3×

- *Gender balance*
- *Education & Outreach*
- *Industry*

Resource aware roadmap in an Int. contest



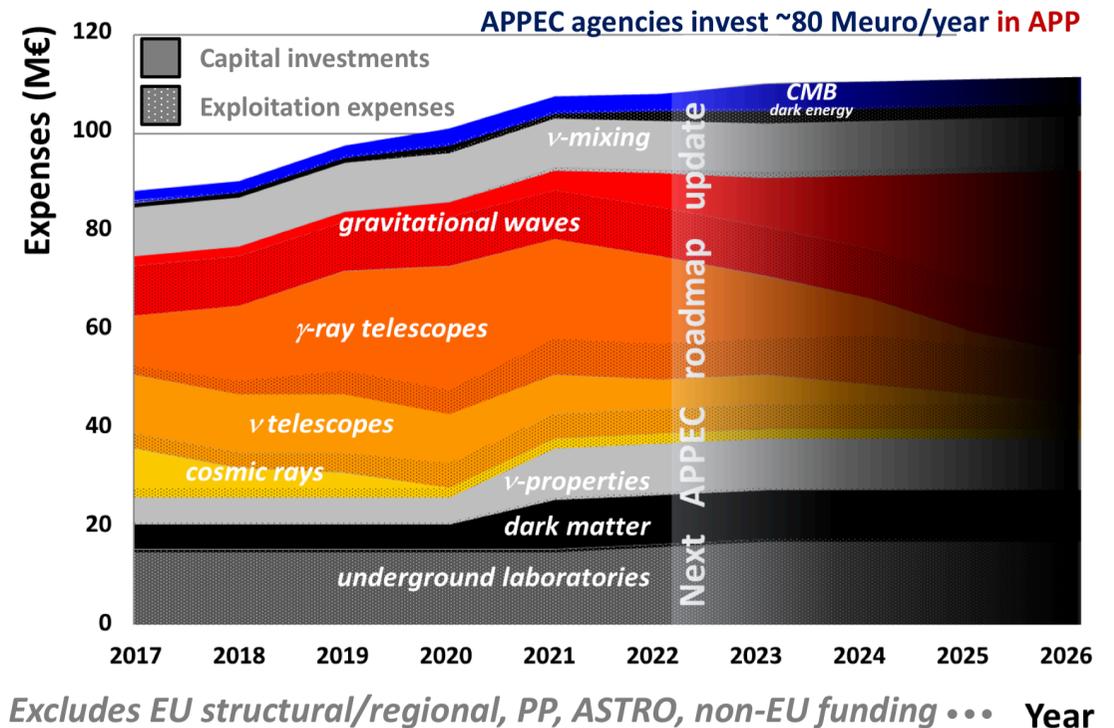
The durability of large RI is addressed by ESFRI:



www.esfri.eu

ESFRI SCRIPTA

Vol. 2



Other highlights from the launch meeting:

– ESFRI ROADMAP 2018 UPDATE PROCESS STARTED (G. ROSSI'S TALK)

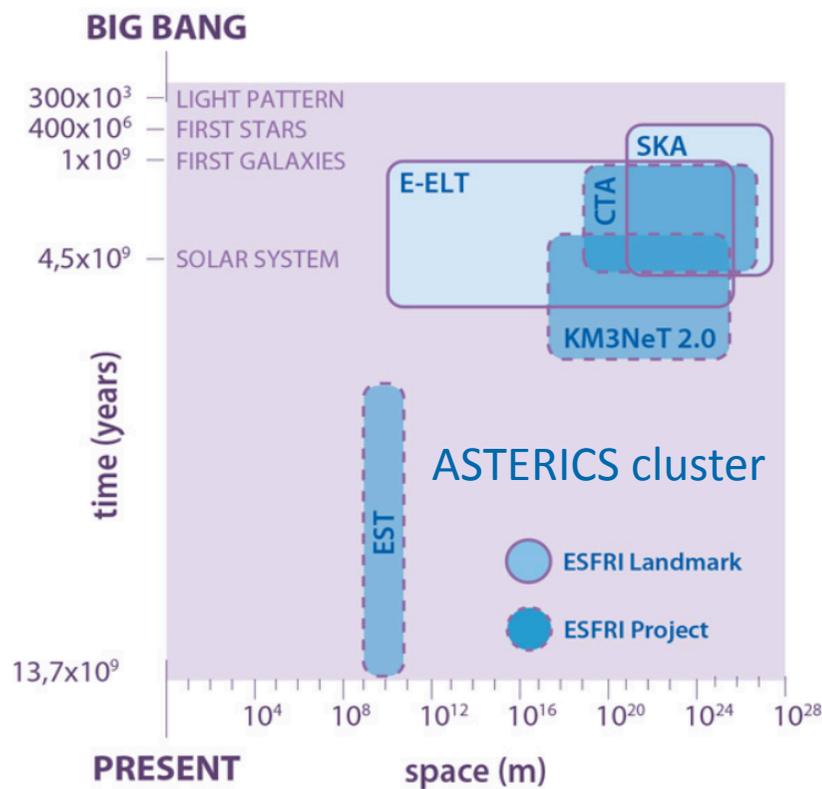
21 Projects

ESFRI PROJECTS							ESFRI LANDMARKS							
NAME	BRIEF NAME	ROADMAP ENTRY (YEAR)	OPERATION (YEAR)	LEGAL STATUS (as of November 2018)	CONSTRUCTION COSTS (M€)	OPERATIONAL ANNUAL BUDGET (M€ in 2020)	NAME	BRIEF NAME	ROADMAP ENTRY (YEAR)	OPERATION (YEAR)	LEGAL STATUS (as of November 2018)	CAPITAL VALUE (M€)	OPERATIONAL ANNUAL BUDGET (M€ in 2020)	
ENERGY	ECCSEL	European Carbon Dioxide Capture and Storage Laboratory Infrastructure	2008	2016	ERIC under preparation	80-120	1**	JHR	Jules Horowitz Reactor	2006	2020*	1.000	NA	
	EU-SOLARIS	European SOLARIS Research Infrastructure for Concentrated Solar Power	2010	2020*	ERIC under preparation	1,20	3-4							
	MYRRHA	Multi-purpose Hybrid Reactor for High-tech Applications	2010	2024*		NA	100							
	WindsScanner	European WindScanner Facility	2010	2018*		45-60	8							
ENVIRONMENT	ACTRIS	Aerosols, Clouds and Trace gases Research Infrastructure	2016	2023*		190	30	EMSO	European Multidisciplinary Seafloor and water-column Observatory	2006	2016	ERIC under preparation	108	36
	DANUBIUS-RI	International Centre for Advanced Studies on River-Sea Systems	2016	2022*		222	28	EURO-ARGO ERIC	European contribution to the International Argo Programme	2006	2014	ERIC, 2014	10	8
	BSCAT_3D	Next generation European Incoherent scatter radar system	2008	2021*		74	6	IAGOS	In-service Aircraft for a Global Observing System	2006	2014	AIGL, 2014	25	6
	EPOS	European Plate Observing System	2008	2020*	ERIC under preparation	53	15	ICOS ERIC	Integrated Carbon Observation System	2006	2016	ERIC, 2015	48	24-35
	IBIG	Svalbard Integrated Arctic Earth Observing System	2008	2020*		80	2-3	LifeWatch	e-Infrastructure for Biodiversity and Ecosystem Research	2006	2016	ERIC under preparation	66	10
HEALTH	AnaEE	Infrastructure for Analysis and Experimentation on Ecosystems	2010	2018*		200	2-3**	BRMIR ERIC	BioBanking and BiMolecular resources Research Infrastructure	2006	2014	ERIC, 2013	170-220	3,3
	EMERIC	European Marine Biological Resource Centre	2008	2016	ERIC under preparation	45	6	EATRIS ERIC	European Advanced Translational Research Infrastructure in Medicine	2006	2013	ERIC, 2013	500	2,3
	EMPHASIS	European Infrastructure for multi-scale Plant Phenomics and Simulation for food security in a changing climate	2016	2020*		73	3,6	ECRIN ERIC	European Clinical Research Infrastructure Network	2006	2014	ERIC, 2013	1,3	2
	ERPHA	European research Infrastructure on highly pathogenic agents	2008	2018*		NA	NA	ELIXIR	A distributed infrastructure for life-science information	2006	2014	ELIXIR Consortium Agreement, 2013	125	96
	EU-OPENSREEN	European Infrastructure of Open Screening Platforms for Chemical Biology	2008	2018*	ERIC under preparation	7	1,2	INFRAFRONTIER	European Research Infrastructure for the generation, phenotyping, archiving and distribution of mouse disease models	2006	2013	GmbH, 2013 ERIC under preparation	180	80
	Euro-Bioimaging	European Research Infrastructure for Imaging Technologies in Biological and Biomedical Sciences	2008	2017*	ERIC under preparation	NA	1,55	INSTRUCT	Integrated Structural Biology Infrastructure	2006	2012	International Consortium Agreement, 2012 ERIC under preparation		
	EBE	Infrastructure for Systems Biology Europe	2010	2018*		30	7,2							
SPACE	CTA	Cherenkov Telescope Array	2008	2023*		297	20	E-ELT	European Extremely Large Telescope	2006	2024*	Programme of ESA		
	KM3Net 2.0	KM3 Neutrino Telescope 2.0: Astroparticle & Oscillations Research with Cosmics in the Abyss	2016	2020*		92	3	ELI	Extreme Light Infrastructure	2006	2018*	AIGL, 2013 ERIC under preparation		
	EST	European Space Telescope	2000	2015		100	10	EMFL	European Magnetic Field Laboratory	2008	2014	AIGL, 2015		
	ESF UPGRADES	Phase I: Extremely Brilliant Source	2006	2013				ESF UPGRADES	Phase I: Extremely Brilliant Source	2006	2013	Programme of ESF		
	European Spallation Source ERIC	European Spallation Source	2006	2025*				European Spallation Source ERIC	European Spallation Source	2006	2025*	ERIC, 2015		
	European XFEL	European X-Ray Free-Electron Laser Facility	2006	2017*				European XFEL	European X-Ray Free-Electron Laser Facility	2006	2017*	GmbH, 2009		
	FAIR	Facility for Antiproton and Ion Research	2006	2022*				FAIR	Facility for Antiproton and Ion Research	2006	2022*	GmbH, 2010		
	HLLHC	High-Luminosity Large Hadron Collider	2016	2026*				HLLHC	High-Luminosity Large Hadron Collider	2016	2026*	Programme of CERN		
	ILL-DI2D	Institut Max von Laue-Paul Langange	2006	2020*				ILL-DI2D	Institut Max von Laue-Paul Langange	2006	2020*	Programme of ILL		
	SKA	Square Kilometer Array	2006	2020*				SKA	Square Kilometer Array	2006	2020*	SKA, 2011		
	SPIRAL2	Système de Production d'Ions Radioactifs en Ligne de 2e génération	2006	2016				SPIRAL2	Système de Production d'Ions Radioactifs en Ligne de 2e génération	2006	2016	Programme of GANIL		
	CESSDA	Consortium of European Social Science Data Archives	2006	2013				CESSDA	Consortium of European Social Science Data Archives	2006	2013	Nonwagan Limited company, 2013 ERIC under preparation		
	CLARIN ERIC	Common Language Resources and Technology Infrastructure	2006	2012				CLARIN ERIC	Common Language Resources and Technology Infrastructure	2006	2012	ERIC, 2012		
	DARIAH ERIC	Digital Research Infrastructure for the Arts and Humanities	2006	2019*				DARIAH ERIC	Digital Research Infrastructure for the Arts and Humanities	2006	2019*	ERIC, 2014		
	ESS ERIC	European Social Survey	2006	2013				ESS ERIC	European Social Survey	2006	2013	ERIC, 2013		
	SHARE ERIC	Survey of Health, Ageing and Retirement in Europe	2006	2011				SHARE ERIC	Survey of Health, Ageing and Retirement in Europe	2006	2011	ERIC, 2011		
	PRACE	Partnership for Advanced Computing in Europe	2006	2010				PRACE	Partnership for Advanced Computing in Europe	2006	2010	AIGL, 2010		

29 Landmarks

ESFRI Landscape for Astronomy and Astroparticle

Figure 1B: space and time domain of investigation of the ESFRI Projects and Landmarks in Astronomy and Astroparticle Physics

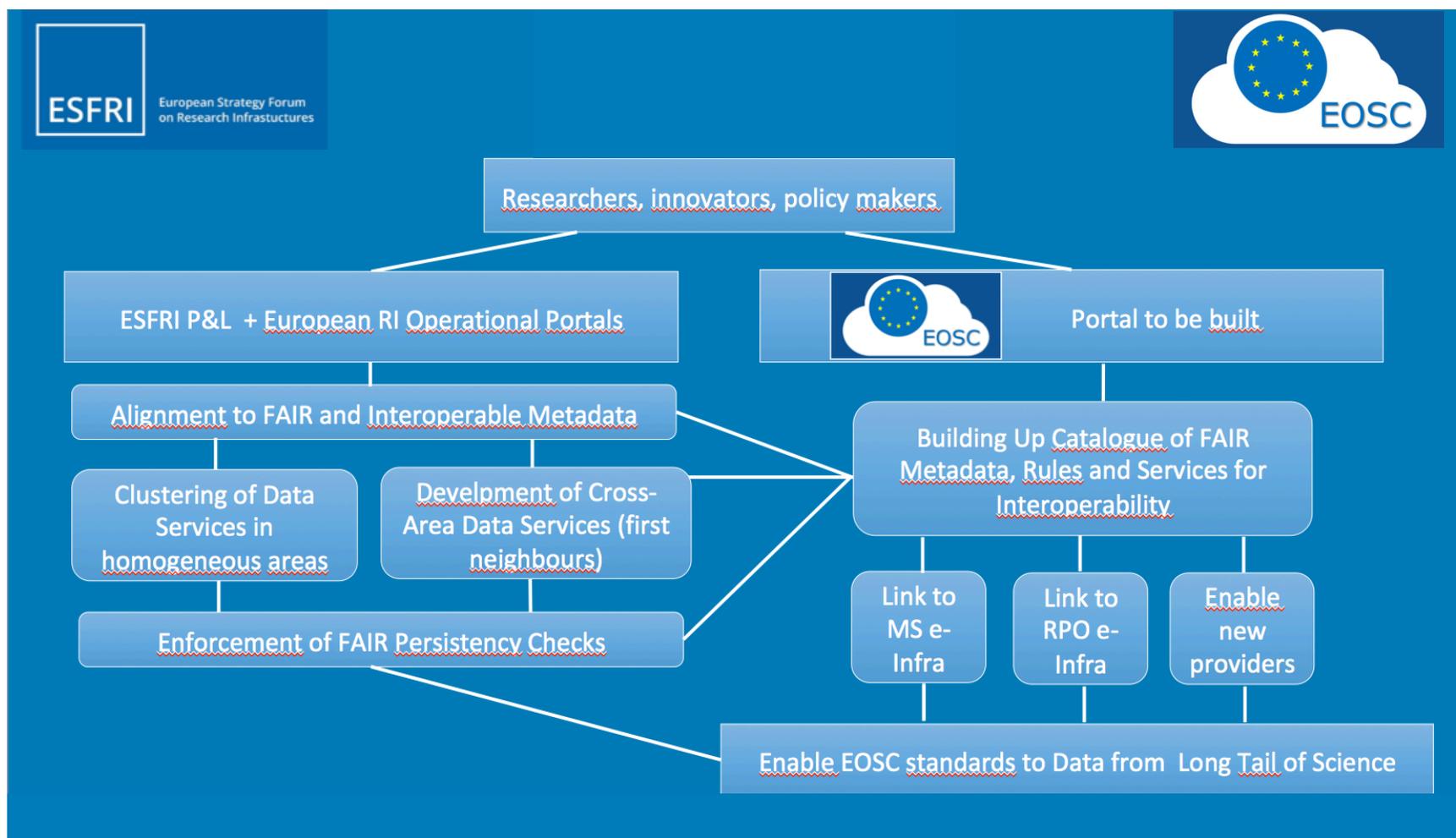


EOSC - EU Open Science Cloud

<https://ec.europa.eu/research/openscience/index.cfm?pg=open-science-cloud>

EOSC should adopt a subsidiarity & participatory principle, should not deligitimate RI's, should fill the gaps of unstructured areas, should be interdisciplinary and interoperable.

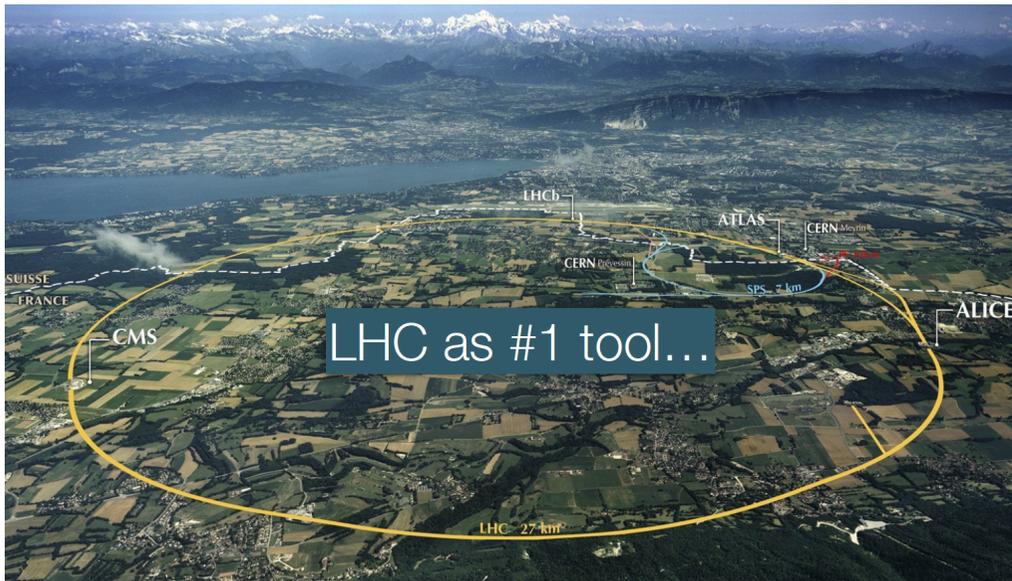
Position of ESFRI on EOSC: ESFRI is more than a "stakeholder" of the EOSC as it represents the effort of the Landmarks and Projects in developing Open Science objectives and namely Open Data policies that amount to ca 15% average of the overall financial effort in RIs. Therefore ESFRI is the Strategy Hub of Founders also for a large share of the EOSC-building actions.



CERN view

E. Elsen

Preparing the European Strategy Particle Physics Update (2020)

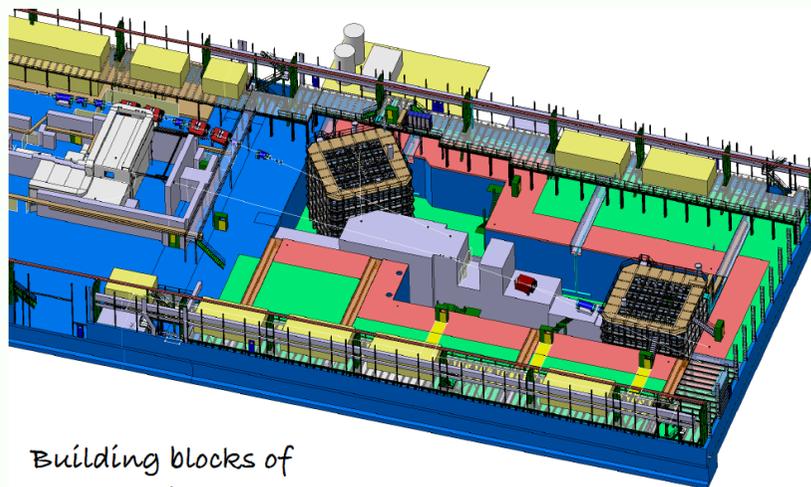


But CERN also establishes formal contacts with neighbouring fields through REC (18 mentioned in APPEC roadmap/28) and Nu Platform. Now also cryo support for DarkSide because DM is keystone science for CERN.

Number	Experiment	First Recognized	valid until
RE 1	AMS	1997	31-DEC-2019
RE 2b	Pamela	1999	31-DEC-2018
RE 3	Auger	1998	31-DEC-2018
RE 6	Anares	1999	31-DEC-2019
RE 7	Fermi ifosmer	2000	31-DEC-2018
RE 8	LISA-PF	2000	31-DEC-2018
RE 10	IceCube	2005	31-DEC-2018
RE 11	MICE	2005	31-DEC-2018
RE 12	MEG	2005	31-DEC-2018
RE 13	T2K	2006	31-DEC-2018
RE 14	Katrin	2007	31-DEC-2019
RE 17	Magic	2008	31-DEC-2017
RE 18	ArDM	2008	31-DEC-2017
RE 19	CREAM	2010	31-DEC-2018
RE 20	Belle II	2011	31-DEC-2019
RE 21	CBM	2011	31-DEC-2019
RE 22	Panda	2011	31-DEC-2019
RE 23	CTA-PP	2011	31-DEC-2017
RE 25	CALET	2012	31-DEC-2017
RE 26	Borexino	2012	31-DEC-2017
RE 27	NEXT	2013	31-DEC-2018
RE 28	Advanced Mojo	2013	31-DEC-2018
RE 29	DAMPE	2014	31-DEC-2019
RE 30	KM3NeT Phase 1	2014	31-DEC-2019
RE 31	Euclid	2015	31-DEC-2018
RE 33	LIGO	2016	31-DEC-2018
RE 34	JUNO	2017	31-DEC-2019
RE 35	SNO+	2017	31-DEC-2019

Neutrino Platform at CERN

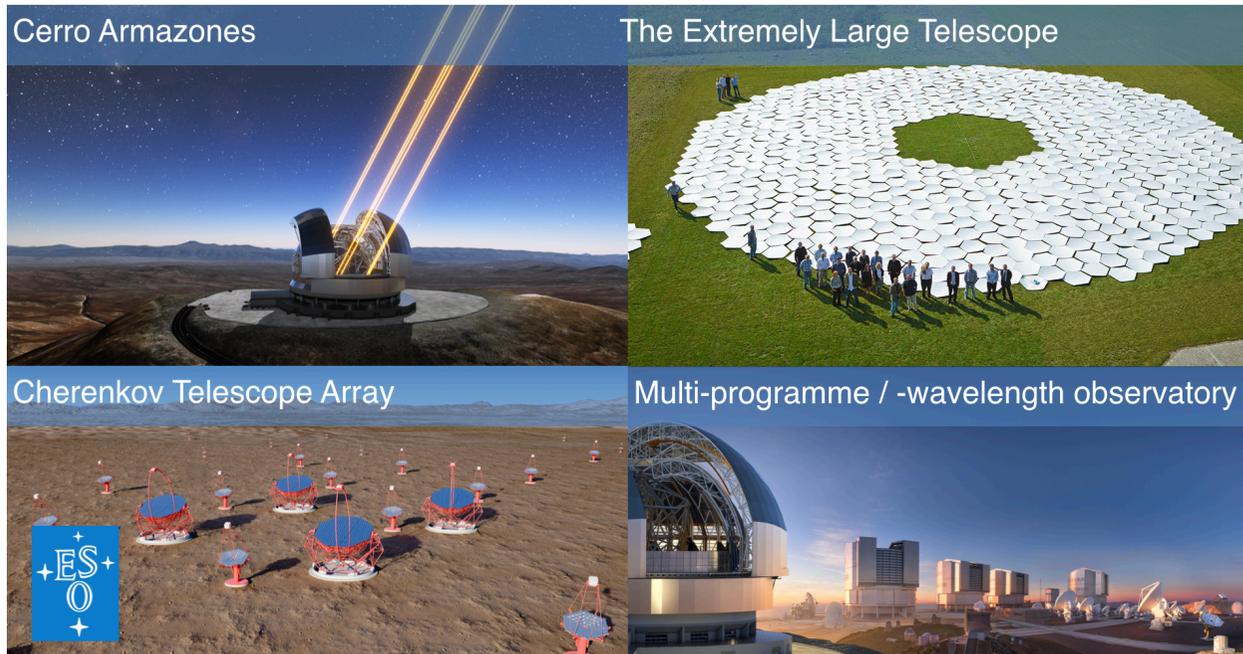
To develop experimental techniques, e.g.
protoDUNE
– single phase LArTPC
– double phase LArTPC



Building blocks of
DUNE detector

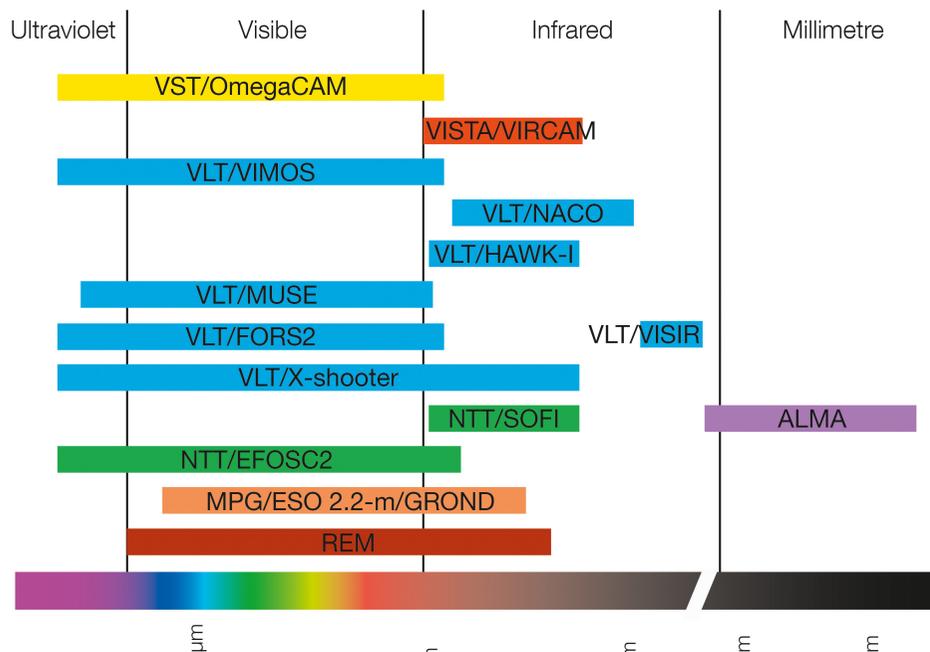
ESO view

European Southern Observatory – in the 2020s



- GWs, neutrinos, gamma rays: posing profound new science questions
- Can be answered only alongside observations of conventional EM radiation
- ***Genuine synergies in multi-messenger era***

Role of ESO for 1st GW event



More than 5,000 scientific images and spectra.

More than 115h of observations.

14 instruments

7 telescopes

Recent news:

- APPEC established a Committee of experts on R&D for next generation ton-scale neutrino-less double beta decay detector to join the analogous committee formed by DOE: A. Giuliani (CNRS/IN3P3, SAC member), E. Previtali (INFN, CUORE), JL Gomez Cadenas (IFIC, NEXT), S. Schoenert (TUM, GERDA, LEGEND), K. Schaeffner (COSINUS, CUPID, CRESST)
- APPEC launched a call for the Astroparticle Physics Theory Centre: in addition to CERN, Univ. Pierre et Marie Curie and Paris Sorbonne, also the Pascal Institute at Paris-Saclay where order of 60 researchers will be invited for several weeks to months of thematic programs.